AARSE

African Association of Remote Sensing of the Environment
Association Africaine de Télédétection de l'Environnement

NEWSLETTER • APRIL 2019

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From the Editor

What do a glove, two cameras, a toothbrush, a pair of pliers and a thermal blanket have in common? Well, they are objects lost by astronauts during space walks and possibly still orbiting Earth.

Some of us might find this fact quite amusing but unfortunately it is part of a bigger problem facing us in outer space right now. Up to 2000 km above Earth, in the region called Low Earth Orbit, space is currently crowded with the remnants of humankind's first 67 years of space exploration. These are thousands upon thousands of pieces of junk such as defunct satellites, spent rocket stages and fragments of collisions and explosions.

Generally referred to as space debris it has reached such proportions that it is even compared to the plastic pollution we face in our oceans today, albeit with a twist. Every piece of space debris orbits earth at such great speed that it is a dangerous missile in itself and a threat not only to expensive space equipment but to life itself.

One shudders at the thought of a collision in outer space resulting in loss of life as a result of garbage dumped by ourselves.

The movers and shakers of the space industry are well aware of this problem but, up to now no one has come up with workable solutions.

In this issue we take a hard look at the causes and the mechanisms at work in our ever-growing space garbage problem.

On a lighter note it must be added that the space industry and especially the remote sensing industry is alive and well and going places in Africa. One can hardly keep up with all the doings of the experts in this field. As you will see from this issue it is clear that Africans are serious about making space technology work for their people on the ground.

Anthony Penderis
Editor
admin@anthonypenderis.com

10 Reasons why you should become an AARSE member

1. You can make a bigger impact on remote sensing in Africa through the Association;

2. You are joining a dynamic and respectable organization founded in 1994 which has received the recognition and support of numerous international organizations;

3. By being a member of AARSE, you can get reduction in membership fees to many organizations and direct access to their publications;

4. AARSE strives to address remote sensing policies and research directions in Africa. By being a member, you can be a part of this important voice;

5. You can attend biennial AARSE Conferences at a reduced rate (or even sponsored in some cases) and also participate in the planning of AARSE events;

6. By becoming a member, you might be able to get the AARSE-IEEE/GRSS Travel Fellowship Award to attend their conferences;

7. If you are an expert in technical remote sensing topics you can join our Technical Program Committee and assist with workshops and training activities;

8. You can utilize the resources provided by AARSE (on remote sensing, GIS and ICT education and training) offered through the courtesy of its partner organizations;

9. Quite often, AARSE suggests and promotes individual members as well as national/ regional members to sit in, or collaborate with, international fora;

10. Other benefits of AARSE Membership include subsidized subscription to the future AARSE Journal of Geoinformation and journals of its partner organisations.

See more at http://www.africanremotesensing.org/Why-Join-AARSE

Sign Up Now for AARSE Membership

You can select your membership level from one of the following: **Student Membership; Regular Membership A (residing inside Africa); Regular Membership B (residing outside Africa); SMME Membership; SMME with ARSGC; Corporate Membership; Corporate with ARSGC Membership**

See selection and payment options at the following links:

http://www.africanremotesensing.org/page-1512797

http://www.africanremotesensing.org/Membership-Payment-Options

AARSE Editorial Contact Details

The AARSE Newsletter is an official publication of the African Association of Remote Sensing of the Environment. During the year 2019 it will be published at least six times starting February 2019 and thereafter every second month until December 2019.

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Message from the President

Dear Readers

With the editorial team, I am pleased to invite you to learn about some news and scientific activity in Africa and around the world, presented in the April 2019 edition of the AARSE Newsletter.

Having just attended the GMES and Africa meeting in Nairobi, Kenya I am now convinced that Africa has fully embraced the Outer Space Program as defined by the African Union's Agenda 2063.

It was especially pleasing to once again be reassured of the full commitment by the African Union Commission which forms an integral part of our strategy to make the satellite industry work for our continent.

I must also make use of this opportunity to thank my two hard-working compatriots Dr. Mahama Quedraogo, AU Director and Chair of PCAC, and Dr. Tidiane Quattara, GMES and Africa co-ordinator, for their total commitment and dedication to this task.

Sustainable development for the African continent is our passion and we are extremely privileged to have the tools of Earth Observation-based services to pursue this goal.

In this vein I must add that the AU's recent allocation of the African Space Agency to Egypt was also a great step forward in our pursuit to make space technology work for the African continent. We are certainly looking forward to their lead, which I am sure will be instrumental in making it possible for all African countries to get on board with the Outer Space Program.

Good Reading

Prof. Kamal Labbassi
AARSE President
2018 - 2022

Members of AARSE Council (2018 - 2022)

Name	Role	Term of office
Prof. Kamal Labbassi	President	2018 - 2022
Mahamadou Keita	Secretary General	2018 - 2020
Dr. Abel Ramoelo	Treasurer	2018 - 2022
Dr. Souleye Wade	Communications	2018 - 2022
Mahamadou Keita	Counsellor for West Africa	2016 - 2020
Prof. Islam Abou El-Magd	Counsellor for North Africa	2018 - 2022
Dr. Yazidhi Bamutaze	Counsellor for East Africa	2016 - 2020
Dr. Aboubakar Mambimba Ndjoungui	Counsellor for Central Africa	2018 - 2022
Dr. Solomon Tesfamicael	Counsellor for South Africa	2018 - 2022
Prof. Olajide Kufoniyi	Immediate Past President	2018 - 2022

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Copernicus Masters 2019 now open for submissions

The 9th edition of the Copernicus Masters is now open for submissions until 30 June 2019. This international competition, open to all, awards prizes to innovative solutions, developments and ideas for business and society based on Earth observation data.

The Copernicus Masters 2019 is searching for outstanding applications, solutions, and business concepts from future-oriented SMEs, start-ups, universities and individuals in the fields of business, research, and higher education.

This year participants can submit their innovative EO solutions to 8 challenges offered by the following partners: European Space Agency (ESA), the German Aerospace Center (DLR), Astrosat, Planet, BayWa, and Airbus together with sobloo and the German Federal Ministry of Transport and Digital Infrastructure (BMVI).

With more than 15 terabytes of free EO data generated by the Copernicus programme every day, the Copernicus services deliver near-real-time data on a global level – contributing towards the sustainable management of the environment.

Participants this year have a chance to win prizes with a total value of more than EUR 450 000.

Visit https://www.copernicus-masters.com/ for more information.

Tunisia to launch its first satellite next year

TELNET Group and GK Launch Services signed a contract for the launch of the first Tunisian Challenge ONE satellite on board the Russian Soyuz-2.1a launch vehicle integrated with the Fregat upper stage in 2020.

The signing ceremony chaired by Mr. Mohamed Frikha, CEO of TELNET Group, and Mr. Alexander V. Serkin, CEO of GK Launch Services, was held at the Sfax Digital Research Centre in Tunisia.

Challenge ONE is a scientific research and innovation project offering new concepts in the information technologies and their practical applications. The results of Challenge ONE in-orbit operation will be used for building a constellation of 30 spacecraft.

One year after the first announcement of the satellite project, TELNET presented the achievements of their designers during the first public in-lab demonstration of the Challenge ONE satellite.

An agreement on cooperation in the field of aerospace R&D between TELNET Group and the Digital Research Centre of Sfax was also signed during the event.

TELNET, founded in 1994, certified ISO9001 and TL9000, is a group of companies in software, mechanical and electronic product engineering. The group offers nearshore and offshore consulting, R&D services and expertise in telecom, multimedia, energy, payment solutions and aerospace.

GK Launch Services is an operator of commercial launches. The company was established by Roscosmos the Russian state space corporation and is authorized to conclude commercial contracts for the launch of spacecraft using Soyuz-2 family launch vehicles from the Russian spaceports.

Source: https://room.eu.com/community/telnet-group-and-gk-launch-services-team-up-for-satellite-launch

Alexander V. Serkin, CEO of GK Launch Services at the front left with Mohamed Frikha, CEO of TELNET Group on the right at the signing ceremony of the contract to launch Tunisia's first satellite in 2020. Image: GK Launch Services.

Smartphone app to assist satellites with Earth Observation

NASA launched ICESat-2 a laser-powered planetary scanning satellite last year, and extended an open invitation to everyone to become citizen scientists to assist them in augmenting their satellite data with a smartphone app.

ICESat-2 measures elevation from orbit as part of NASA's climate research, but the agency would like some data from the ground to verify those readings. So, it's rolled out a new tool in the GLOBE Observer app for iPhone and Android.

ICESat-2 uses an instrument called the Advanced Topographic Laser Altimeter System (ATLAS) to measure elevation from its position 300 miles (500 kilometers) above our heads. ATLAS flashes a 532nm beam of light 10,000 times per second, measuring how long it takes those samples to rebound. That lets NASA, for example, track changes in ice coverage. ICESat-2 isn't only about ice, though. The name stands for Ice, Cloud, and Land Elevation Satellite-2. The latest GLOBE app update focuses on the "land" part.

One of ICESat-2's missions is to estimate the health of the world's forests by tracking the height of the canopy. This is a vital piece of the puzzle because healthy forests soak up a lot of the carbon humans release into the atmosphere. Tom Neumann, a project scientist for ICESat-2 at NASA says it's an open question how accurate the tree height measurements are from space. You can't very well send scientists all over the world to measure trees, but a smartphone app can gather data from citizen scientists rather easily.

To get involved, download the app at https://observer.globe.gov/about/get-the-app on your phone. This isn't a new app, and it contains tools for several different projects. After creating an account, just find the 'GLOBE Trees' tool in the list.

The phone will guide you through the process of pointing the phone at the top and base of the tree. The app uses simple geometry from the sensors in your phone to work out the height of the tree.

Download the app at https://observer.globe.gov/about/get-the-app

Sources: www.observer.globe.gov/

International Space Conference Diary 2019

We have assembled the details of the most important international and African conferences in the arena of remote sensing, satellites and geotechnical applications scheduled to take place later this year. Please visit their individual websites for more information on submission criteria for papers, deadlines for registration, etc.

Satellite 2019
May 6 - 9, 2019; Washington, DC
2019.satshow.com

A four-day conference, comprised of 70+ sessions led by 250+ technology and connectivity experts representing more than 110 nations from around the world. A total of 340 exhibiting companies and 15 000 attendees are expected. US Vice-President Mike Pence will deliver special keynote address.

Eastern Africa GNSS Workshop
May 13 – 17, 2019; Nairobi, Kenya
www.pu.ac.ke

The Eastern Africa GNSS and space weather capacity building workshop is aimed at developing a regional team to enhance capacity building in space weather monitoring over the region. The five days space weather workshop will be conducted at the Pwani University.

The Humans to Mars Summit 2019
May 14 - 16, 2019; Washington, DC
h2m.exploremars.org

The Humans To Mars Summit (H2M) is to advance humanity to the Martian surface by the 2030s. Keynote speakers will include NASA Administrator Jim Bridestine and the 'Second Man on the Moon' Buzz Aldrin.

AngaCom 2019
June 4 - 9, 2019; Cologne, Germany
www.angacom.de

A three-day conference for broadband, television and online operators and content providers. Target groups of exhibition and conference are network operators, vendors, content providers, service providers, consultants, authorities and other organizations of the telecommunications and media industry.

SA GeoTech Conference
July 22 – 23, 2019; Ekurhuleni, South Africa
www.ee.co.za

The conference and exhibition will bring together leading thinkers and doers around the theme 'Geo-tech to drive new business opportunities and economic growth.' It seeks to promote geospatial solutions and professionals.

Small Satellite Conference
August 3 - 8, 2019; Logan, Utah
www.smallsat.org

The 33rd AIAA/USU Conference on Small Satellites aims to explore the technical issues, development considerations, and new opportunities that result from an ever-growing trend toward missions using small satellites. Mr. Greg Wyler OneWeb founder will be the keynote speaker.

RCMRD International Conference
August 14 – 16, 2019; Nairobi, Kenya
rcmrd.org/ric2019

The 3rd RCMRD International Conference will have the theme 'Earth Observation for Evidence-Based Decision Making'. Their mission is to promote sustainable development in the member states through geo-information technologies.

Africa Geospatial Data/Internet Conference
October 21 – 25, 2019; Accra, Ghana
www.afrigeocon.org

The Conference serves to bring people together from various stakeholder groups as equals and to facilitate a common understanding of how to maximize geospatial and Internet opportunities in Africa and address risks and challenges.

AfricaGIS 2019
November 18 - 22, 2019; Kigali, Rwanda
www.eis.africa/africagis-2019

The largest Geospatial, Science and Technology conference on the African Continent held every two years. It explores the role of innovations in geospatial information and its implication in addressing the 17 targets of the Sustainable Development Goals for Africa.

Senegal advances its space strategies

The Senagalese government held a national workshop on the development of its space policy and strategy in Dakar last month.

The workshop, an initiative of Prof. Mary Teuw Niane, Minister of Higher Education, Research and Innovation was held from February 28 to March 1, 2019 and chaired by Prof. Amadou Thierno Gaye, Director General of Research and Innovation.

The workshop was held in the context of pre-vious resolutions in the space arena such as :

• the creation of the GEO (Group on Earth Observations) in 2005, a worldwide intergovernmental organization working to improve the availability, access and use of Earth observations data for the benefit of mankind. Senegal is one of 105 members of the GEO;
• the adoption of the African Space Policy and Strategy by African Union Heads of State and Government in January 2016;
• the establishment of the African Space Agency and the adoption of its Statutes by the 30th Ordinary Session of the Assembly of the African Union held on January 29, 2018, in Addis Ababa, Ethiopia;
• the approbation of Egypt's application to host the African Space Agency by Heads of State and Government at the 32nd Ordinary Session of the Assembly of the African Union held in February 2019 in Addis Ababa, Ethiopia.

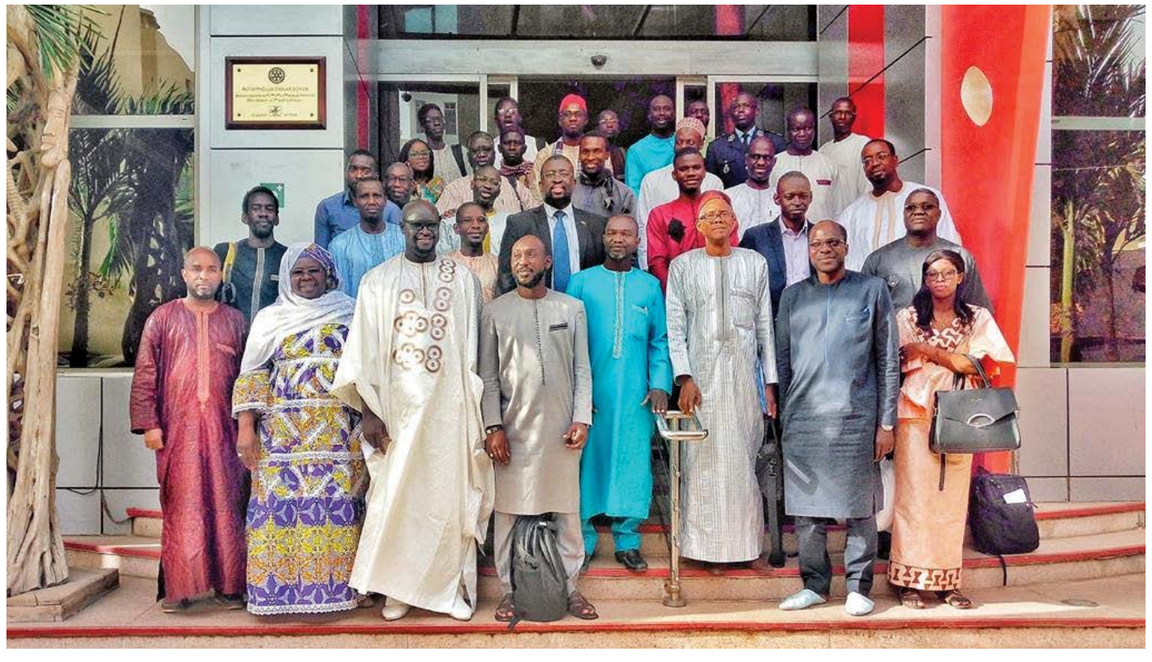
Prof. Mary Teuw Niane, Senegal's Minister of Higher Education, Research and Innovation. Image: kewoulo.info

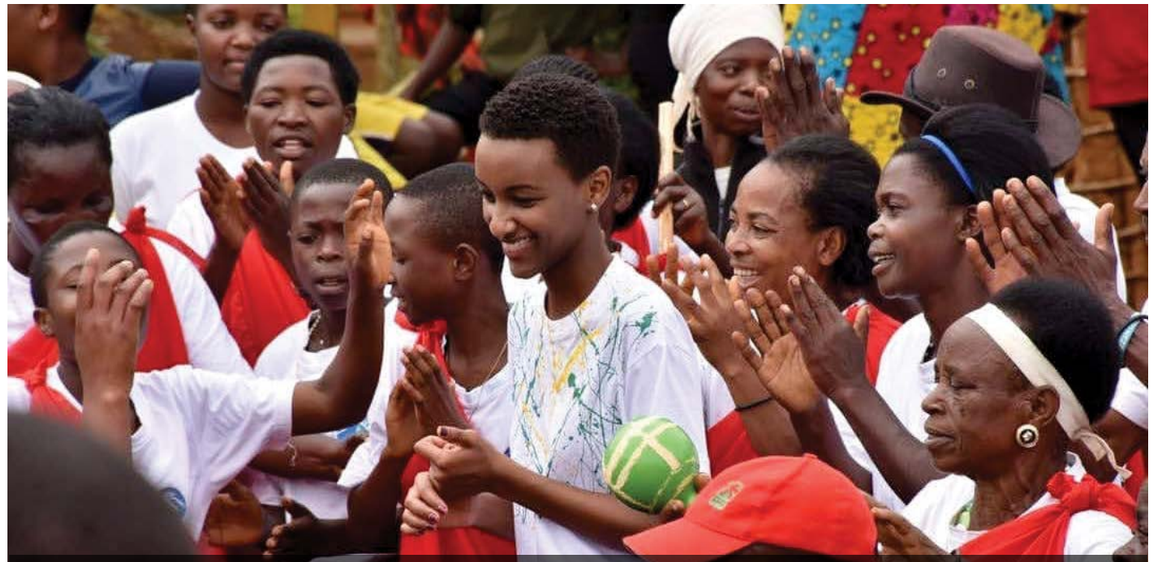
The main objectives of the workshop were:

• to review the status of training and research in space science and technology in Senegal with regards to Earth observation, global navigation and satellite positioning systems, satellite communications, space science and astronomy;
• to design a strategy for the development of training, research and development, innovation and space applications, and to take into account the needs of Senegal in this regard;
• to elaborate Senegal's space policy and strategy and propose a mode of institutional governance, as well as mechanisms for its implementation;
• to define a relevant funding strategy for Senegal's space policy.

The attendees expressed their gratitude to Prof. Mary Teuw Niane for the initiative to organize this important workshop and expressed their wishes that the Sengalese government would adopt the recommendations formulated at the workshop. This could enable Senegal to embark on a sustainable program for African spacecraft to leverage geospatial science and technology for its economic and social development.

Attendees at the Senagalese government's national workshop on the development of its space policy and strategy held in Dakar last month.





Rwanda partners with OneWeb to launch internet satellite for rural schools

The Rwandan government secured their own satellite to provide internet connectivity to their rural schools. This satellite was part of the payload of first six satellites launched by OneWeb in French Guiana which will pave the way for the company's global constellation of satellites.

The Government of Rwanda together with the SoftBank Group Corp., Grupo Salinas, and Qualcomm Technologies Inc. contributed another $1.25 billion to OneWeb's fundraising efforts now totaling $3.4 billion. OneWeb in a statement said that the new funds, following the successful first launch of OneWeb's satellites, enable the company to accelerate the development of the first truly global communications network by 2021. OneWeb aims to deliver high speed, low latency, seamless broadband access, everywhere on Earth.

Paula Ingabire, Rwanda's Minister of Information and Communications Technology (ICT) and Innovation defended her government's investment by pointing out that the use of standard fiber optics would have been a more expensive choice.

"Rwanda's choice to invest in space technologies is part of our broader mission to bridge the digital divide by providing equal digital opportunities to rural and remote communities. This partnership responds to our intention of becoming a regional Technology Innovation Hub, opening new pathways for connectivity, providing better education and creating new opportunities for our innovators," she said.

Rwanda's Minister of Education Dr. Eugene Mutimura also pointed out that: "Connecting schools is a foundational aspect and driver of transformative learning. Rwanda's education Master Plan in ICT outlines ambitions of interventions to connect schools and empower Rwandan children with immense opportunity, notably research, support our competence-based learning, ease to access and share digital content, support systems to monitor and evaluate process among others."

Paula Ingabire is a Rwandan technology enthusiast and politician, who has served as the Minister of Information and Communications Technology and Innovation, in the Cabinet of Rwanda, since 18 October 2018.

Iradukunda Liliane the first Miss Rwanda to visit Nkombo Island on Lake Kivu between Rwanda and the Democratic Republic of Congo (DRC). Image @MissRwandaDotRW

The Rwandan satellite on the payload was named Icyerekezo by students from Nkombo Island in rural Rwanda at Lake Kivu.

OneWeb tweeted that they have reached another big milestone by finishing testing the primary and redundant systems of their six satellites in orbit and that the next step would be to raise them up to a 1,200 km orbit.

Sources
https://thisisafrica.me/rwanda-launches-satellites-connect-rural-schools/
http://www.techinafrica.com/rwandan-government-and-one-web-launch-satellite-broadcaster/
https://www.oneweb.world/newsroom/oneweb-secures-1-25-billion-in-new-funding-after-successful-launch

Focus on an African Personality in Space Science and Technology

Professor Jamal Mimouni

"We need to bring African astronomy to a respectable level on the world scene as it has been lagging relatively much behind the other regions on the planet."

Professor Jamal Mimouni first elected President of the African Astronomical Society

Professor Jamal Mimouni from the Physics Department at Mentouri University in Constantine, Algeria has been elected at the first President of the newly founded African Astronomical Society (AfAS) at their first conference in Cape Town,

His election came after two days of presentations and discussions by 80 delegates from 20 countries from the 25 to 26 March at the birthplace of modern astronomy in Africa, the Southern African Astronomical Observatory in Cape Town. This also lead to the adoption of a new constitution, the name African Astronomical Society and the election of an Executive Committee consisting of 8 members. The South African government has offered to host a staffed secretariat for the first 3 years.

In response to the AARSE Newsletter's inquiry on how he sees the challenges of his new position he answered as follows: "The task at hand is enormous. We need to bring African astronomy to a respectable level on the world scene as it has been lagging relatively much behind the other regions on the planet. It has tremendous potential, in particular thanks to the top world facilities in South Africa such as SALT on the Sutherland plateau, which is the largest optical telescope in the world, the MeerKAT radio telescope which is a precursor to the Square Kilometer Array (SKA) radio telescope network. I may also mention the High Energy Stereoscopic System (H.E.S.S.) based in Namibia, a network of Cherenkov Telescopes for the investigation of gamma rays.

"We hope that these projects can ripple outward and play the role of a locomotive for African astronomy, especially in helping develop a human potential in academia and research. We also wish to work hand in hand with the astronomy associations and like-minded ones to bring into focus the cultural value of science in uplifting the societies - a whole program in itself!

"So the AfAS's ambition is to work on those capacity building missions and also link together the various African countries which, up to now, didn't have any national organization. A date which we have set as a marker to our actions is the International Astronomical Union General Assembly meeting in South Africa in 2024, which will be the first time that the its GA will be hosted in Africa since the founding of the IAU in 1919."

The members of the AfAS Executive Committee elected at their first meeting are people of various expertise in academic research, teaching, public interactions and outreaching representative of Africa in its diversity and human potential.

President:
Jamal Mimouni (Algeria)

Vice-President:
Lerothodi Leeuw (South Africa)

General Secretary:
Sarah Abotsi-Masters (Ghana)

Assistant General Secretary:
Charles Takalani (South Africa)

Public Relations and Education Officer:
Olayinka Fagbemiro (Nigeria)

Early Career Representative:
Zara Randriamanakoto (Madagascar)

Additional Member #1:
Palesa Nombula (South Africa)

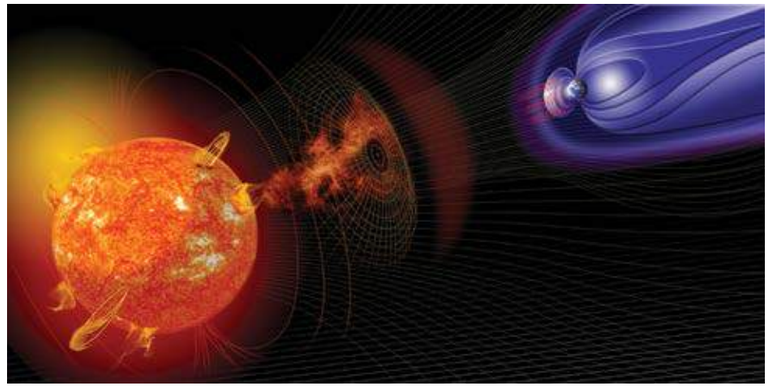
Additional Member #2:
Etsegenet Getachew (Ethiopia)

For more information contact prof Jamal Mimouni at jamalmimouni@yahoo.com or Kevin Govender at kg@astro4dev.org.

In our series Discovery of an African Space Institution in this issue we focus on a regional Space Weather Warning Centre operated by the South African National Space Agency (SANSA) in Hermanus, South Africa.

Discovery of an African Space Institution

SANSA has recently been selected by the International Civil Aviation Organization (ICAO) as one of two accredited regional warning centers world-wide to provide space weather service, in conjunction with three global centers, to the aviation sector. The three global centers are run by the USA, the Pan-European Consortium PECASUS, and one by a consortium from Australia, Canada, France and Japan. The space weather station also forms part of the International Space Environment Service (ISES) world-wide network of 19 regional warning centers with SANSA's space weather center being the only one in Africa.



This NASA image shows how the Earth's magnetic field is impacted by the solar wind

The function of a Space Weather Warning Centre is mainly to monitor the magnitude of solar storms on the surface of the sun and the effect it can have on modern technologies we are dependent on such as satellites, GPS, power grids, navigation and communication systems.

"With aviation, we consider four key risk areas – communication, navigation, avionics and radiation exposure," said SANSA MD, Dr Lee-Anne McKinnell. "High frequency radio communication, as well as ground and air-based navigation systems, can be affected or knocked out entirely by space weather storms. Delicate electronics can also be damaged, and radiation exposure poses a hazard for crew and passengers especially for long haul flight."

Satellites in orbit as far as 1000 km from Earth are also vulnerable to geomagnetic storms caused by solar flares. This causes the Earth's atmosphere to expand and increases the drag on these satellites which can make it slow down, alter orbit slightly and eventually fall back to Earth earlier than planned. Miniaturized systems and electrical charges on the satellite itself can also be affected during geomagnetic storms.

A typical space weather report by SANSA such as the one published on 28 March 2019 reads as follows: 'Solar activity is low with background X-ray flux at lower B-class levels. The solar wind speed is slowly increasing with speeds between 340 km/s - 415 km/s due to the influence from coronal hole 92 (CH92). Geomagnetic conditions are at quiet levels. Local HF working frequencies are near monthly average predicted values.'

"South Africa's designation as a regional space weather information provider will grow the science, engineering, technology and innovation sector, offering opportunities to develop scarce skills and increase national research output, while ensuring that usable products and services are generated for the safety of the nation," said Minister of Science and Technology, Mmamoloko Kubayi-Ngubane.

Sources:
https://spaceweather.sansa.org.za/; http://www.spaceweather.org/ISES/swxeff/stl.html

Dr Rendani Nndanganeni a space weather researcher working at the SANSA Space Weather Centre.

Officials at the unveiling of of SANSA's newly upgraded Space Weather Regional Warning Centre in Hermanus are form left SANSA CEO, Dr Val Munsami, Space Weather Scientist, Teboho Nxele, SANSA MD, Dr Lee-Anne McKinnell, Minister of Science and Technology, Mrs Mmamoloko Kubayi-Ngubane, Space Weather Researcher, Dr Rendani Nndanganeni, Space Weather Practitioner, Mpho Tshisaphungo and Space Weather Researcher, Dr Tshimangadzo Matamba.

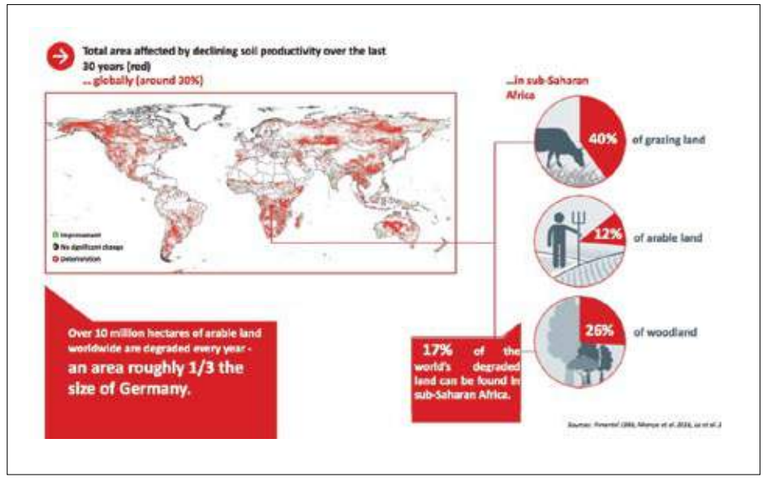
Call to join GEO Land Degradation Neutrality Initiative

A call for secondments has been issued to join the Steering Committee of the intergovernmental Group on Earth Observations (GEO) addressing the global challenge of land degradation under the auspices of the United Nations Convention to Combat Desertification (UNCCD).

This important initiative came into effect in January 2016 with 17 Sustainable Development Goals. Their goal number 15.3 inter alia states that: 'By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation neutral world.'

The UNCCD reports that two-thirds of the African continent is desert or drylands. These areas are vital for agriculture and food production, but nearly three-fourths of it is estimated to be degraded. Frequent droughts and relative poverty make the African continent particularly susceptible to the impacts of land degradation. All African countries are parties to the UNCCD, and significant steps have been made to improve regional cooperation and develop action plans to tackle the causes and impacts of land degradation.

This however constitutes only 17% of the world's degraded land now estimated to grow by 10 million hectares per year. To date, 121 countries have committed to setting Land Degradation Neutrality (LDN) targets. Some 80 of these countries have already set their targets, and many have secured high-level government commitment to achieve LDN.



This diagram illustrates the severity of arable land degradation worldwide. Up to now 121 countries have committed to the UNCCD objective to reach Land Degradation Neutrality by 2030.
Image Source: Antje Hecheltjen (antje.hecheltjen@giz.de); Sasha Alexander (salexander@unccd.int)

In a statement issued by GEO LDN it is pointed out that 'some of us live in such plenty that the toll of degraded lands on agriculture, nutrition and the quality of ecosystems close to human settlements is hard for us to comprehend. Once productive fields and pastures have now become little more than wasteland, forests stripped bare for fuel or damaged by resource extraction add to the precariousness of many countries and communities dealing with the effects of climate change, economic hardship and dislocation due to conflict'.

The GEO LDN Initiative includes three working groups: (1) capacity building, (2) data quality standards, and (3) data analytics. Secondments are invited to support the Steering Committee, working groups and their user-driven work plans with this important Initiative that will benefit countries and communities worldwide.

To become involved contact the GEO Secretariat at secretariat@geosec.org or Douglas Cripe at dcripe@geosec.org.

GEO GROUP ON EARTH OBSERVATIONS

Sources:

https://www.earthobservations.org/activity.php?id=149

https://knowledge.unccd.int/topics/sustainable-development-goals-sdgs/sdg-indicator-1531

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United Nations Convention to Combat Desertification

EU reiterates full support of African Agenda 2063 Outer Space Program

The European Union reaffirmed their full commitment to make the Global Monitoring for Environment and Security and Africa (GMES & Africa) initiative work at a recent three-day meeting in Nairobi, Kenya.

In a statement released by GMES & Africa on 4 March 2019, Pietro Nardi a representative of the European Commission, pledged the European Union's full commitment to making GMES and Africa and related initiatives a success. He also told officials at the opening ceremony that the program contributes to achieving the goals that Africa and Europe have set themselves in broader frameworks such as the 2030 Agenda for Development; the Sendai 2015-2030 Action Framework for Disaster Risk Reduction, and the Paris Climate Agreement.

Dr Mahama Quedraogo Chair of the GMES and Africa Policy Coordination and Advisory Committee (PCAC)

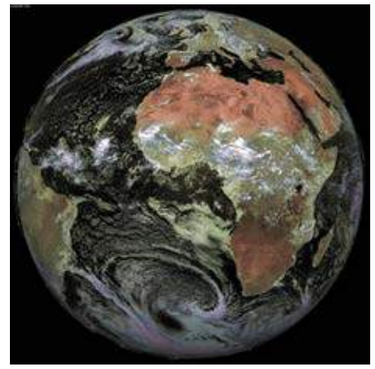
Director of Human Resources, Science and Technology at the African Union commission, Dr. Mahama Ouedraogo, Chair of the GMES and Africa Policy Coordination and Advisory Committee (PCAC), said at the opening ceremony on Wednesday, 27 February that the GMES and Africa program is one of the concrete steps initiated to realize Africa's Agenda 2063 through the African Outer Space Program. According to Dr. Mahama, information and data from Space are important decision support tools for Africa's Sustainable Development.

Dr. Tidiane Ouattara the GMES and Africa Coordinator, as well as the expert for Space Science at the African Union Commission briefed members of the PCAC, which is GMES and Africa's governing body, on the current status and achievements of the program. He pointed out the five results of the 2019 work plan both at the continental and regional levels. These include Data Access and Infrastructure; Service Development; Capacity Building; Project Management; and Communications and Outreach.

The three-day meeting in Nairobi, Kenya was mainly to discuss progress made so far in the five result areas of GMES and Africa. The PCAC comprises representatives of the African Union Commission, the European Commission, African Regional Economic Communities, European partners including EUMETSAT, the European Commission Joint Research Centre (JRC) and the European Space Agency (ESA), as well as UN Agencies.

The GMES & Africa initiative is the crystal-lization of the longstanding cooperation between Africa and Europe in the area of space science & technology, which is one of the key priorities of the long-term EU-Africa Joint Strategy. This partnership ensures inter alia that all European infrastructure and facilities under the Copernicus program are available to Africa.

The mission of GMES & Africa is to promote the development of local capacities, institutional, human and technical resources for access to and exploitation of EO-based services on an operational basis for sustainable development in Africa.



Africa Satellite Map by GMES & Africa

The Action Plan initiated a long-term structured dialogue between Africa and Europe on EO systems to response to global needs, to manage the environment, understand and mitigate the effects of climate change and ensure civil security by providing information to policymakers, scientists, businesses and the public on a real-time basis.

Nine thematic chapters identified and agreed on for the Action Plan are: (i) Long term Management of Natural Resources; (ii) Water Resource Management; (iii) Marine & Coastal Areas Management; (iv) Food Security and Rural Development; (v) Climate Variability and Change; (vi) Disaster Risk Reduction; vii) Health; (viii) Conflict and Political Crisis, and (ix) Infrastructure and Territorial Development. The following cross-cutting areas were also identified: (a) Policy and Institutional framework (b) Infrastructure framework (c) Capacity Development framework (d) Financial issues, and (e) Monitoring and Evaluation.

Source:
https://gmes4africa.blogspot.com/

GMES AND AFRICA

Paper call for Environmental Sustainability with Remote Sensing in Africa

Researchers in the field of remote sensing relevant to Africa should take note of the latest paper call by Elsevier publishers. The subject of this paper call is 'Environmental Sustainability with Remote Sensing in Africa' which will be published in a special issue of the prestigious ***ISPRS Journal of Photogrammetry and Remote Sensing***.

The Elsevier guidelines state inter alia that it aims to promote earth observation research in Africa and that their theme is 'dedicated to relevant scientific contributions that addresses environmental problems facing Africa using remote sensing'.

Authors are invited to submit papers on a range of topics, but not limited to:

1. Biomass and rangeland productivity monitoring;
2. Forests and resource conservation (landscape dynamics, ecosystem services, etc.);
3. Alien invasive plant species and bush encroachment;
4. Agricultural productivity and food security (crop mapping, yield prediction, pests and diseases, etc.);
5. Hazards and disaster management (drought, floods, fire, etc.);
6. Urban and peri-urban management.

The deadline for paper manuscript submissions is on **31 December 2019** and the guidelines can be found here. (https://www.journals.elsevier.com/isprs-journal-of-photogrammetry-and-remote-sensing/call-for-papers/environmental-sustainability-with-remote-sensing-in-africa)

Call for Sub-Saharan Africa Women in Science Applications

Women enrolled in a doctoral or post-doctorate program with a Sub-Saharan Africa nationality are eligible to apply for 20 grants ranging from 10 000 to 15 000 Euro offered by the L'Oréal-UNESCO for Women in Science program.

Applicants need to be working in one of the region's countries or be enrolled in a doctoral programme at a university in Sub-Saharan Africa. Applicants also need to pursue research in the field of Life Sciences, Physical Sciences, Mathematics or Computer Sciences.

Founded in 1998, the L'Oréal-UNESCO For Women in Science partnership was created to recognize and promote women in science. Its programs reward established women scientists whose outstanding achievements have contributed to the advancement of scientific knowledge and of its benefits to society and provide support to promising young women who are already making significant contributions in their scientific disciplines.

The 2019 application deadline is on 29 April. Go to https://www.forwomeninscience.com for the online application.

For Women in Science
FONDATION L'ORÉAL

UK Space Agency funds developing countries

The UK Space Agency through its 5 year, £152 million International Partnership Programme (IPP) now funds new space science and exploration projects in developing countries. The IPP seeks to maximise the practical impact on the lives of those living in developing countries by partnering with developing countries to use space solutions to solve their specific development challenges, and in doing so increase their capacity

It will provide grants of between 50-100% (depending on the size and type of establishment) for organisations to run projects over the course of the 5 year programme which provide practical and measurable effects to end-users in developing countries. The programme will be delivered through a series of calls run by the Agency's IPP team. Within each call there is an open call, a study scoping call, a tactical call for a specific problem identified by a developing country's government and a strategic call tackling a particular theme identified by DFID. Keep an eye on the Agency's Funding Opportunities page for further call announcements.

Anyone with an 'ad hoc' idea, should send a statement of interest directly to the UK Space Agency for a review by an advisor to be recommend if a full proposal should be send for consideration by the space agency peer review panel.

The application form for Statement of Interest in future major project can be downloaded here https://www.gov.uk/guidance/apply-for-funding-academic-community-and-educational

UK SPACE AGENCY

Space Debris!
A minefield for future space exploration in the making?

The outcome of India's recent anti-missile test on an ageing satellite of their own brought the matter of the ever growing space debris problem to the foreground.

Despite the Indian government's claim that their experiment was a success and they are now proud to be the fourth country after China, Russia and the USA with a space defence capability the matter did not rest there. The Indians destroyed their defunct Microsat-R satellite in Low Earth Orbit at a height of 300 km and assumed the debris will fall back to Earth and burn out in the upper atmosphere. Unfortunately the exploding satellite scattered fragments to higher levels, some of them now tracked in orbits more than 2 000 kilometres from Earth.

This elicited an angry reaction from NASA Administrator Jim Bridenstine who claimed that it puts the International Space Station at risk as 24 of the 400 pieces of debris were tracked near the International Space Station orbit path 400 km above Earth.

This is but a small number compared to the estimated 300 000 or more man-made objects now orbiting earth. Current technology only makes objects 10 cm or larger trackable which now numbers some 23 000. Tracking is done by the Combined Space Operations Center (CSpOC) a platform created for cooperation between the U.S. and its allies to safeguard the space domain.

Several other incidents which have increased the number of man-made fragments orbiting Earth dramatically have also been reported over the years. These were notably USA and Russian anti-satellite weapons testing programs in the early 1960s and 1970s and lately the Chinese anti-satellite test in 2007, their Long March rockets exploding in space twice (2000 and 2012); a collision between two satellites Iridium 33 and Cosmos 2251 in 2009; and the explosions of the Russian upper stage BRIZ-M rockets in 2007 and 2012.

The NASA scientist Donald J. Kessler proposed a theory in 1978 now known as the Kessler Syndrome which states that if two objects collide in say Low Earth Orbit it would increase the likelihood of further collisions in an ever increasing cascade that would make space activities impossible in that specific orbital

Damage caused to the Russian Mir space station after collision with Progress M-34 an unmanned supply vehicle is clearly visible from this picture which was taken by Space Shuttle Atlantis in 1997. The Mir crew was constantly at risk to a variety of space debris which often forced the crew to sleep in their Soyuz transport vehicle should an emergency evacuation be necessary. The Mir was decommissioned after 15 years of service and burned out on reentry to Earth in March 2001.
Image: NASA/SCIENCE PHOTO LIBRARY

range. Head-on strikes between two orbiting man-made objects in space can happen at speeds of up to 16 km/s or 57 600 km per hour (35 790 miles per hour) which makes the smallest grain of space debris a deadly missile.

A number of incidents have already been reported where space junk possibly affected space operations. During its first 15 years of operations the ISS had to do 16 manoeuvres to get out of the way of space junk. The Space Shuttles Atlantis and Endeavour have both been hit by space junk, in 2006 and 2007 respectively, which bore holes through their fuselages fortunately with no loss of life. Then there is the ever-growing list of satellites that go defunct because of suspected micrometeorites and orbital debris (MMOD) strikes. These include inter alia the Russian Kosmos 1275 (1981), Ekspress AM11 (2006), and Blits (2013); the French Cerise (1996); and NASA's Terra (2009). Many more satellites simply go silent or engineers fail to make contact shortly after launch which points to either human error or possibly MMOD strikes.

The cardinal question that presents itself here is whether we already found ourselves at the beginning of the Kessler Syndrome kicking in? Could this eventually reduce Low Earth Orbit to an outer space mine field, which will pose great dangers and high risks for future space farers.

The world's leading space agencies are all acutely aware of the ever-growing space junk problem and many strategies are planned or in the process of being tested to counter this problem, which hopefully will not be too late.

Anthony Penderis

Sources:
www.satellitetoday.com
www.spacedaily.com
www.sputniknews.com
www.executivegov.com

Space Alphabet

The space industry is not called burgeoning for nothing. There is so much happening that it's difficult to keep track of all the developments. In this issue we bring you a number of the most recent announcements in alphabetical order.

Amazon

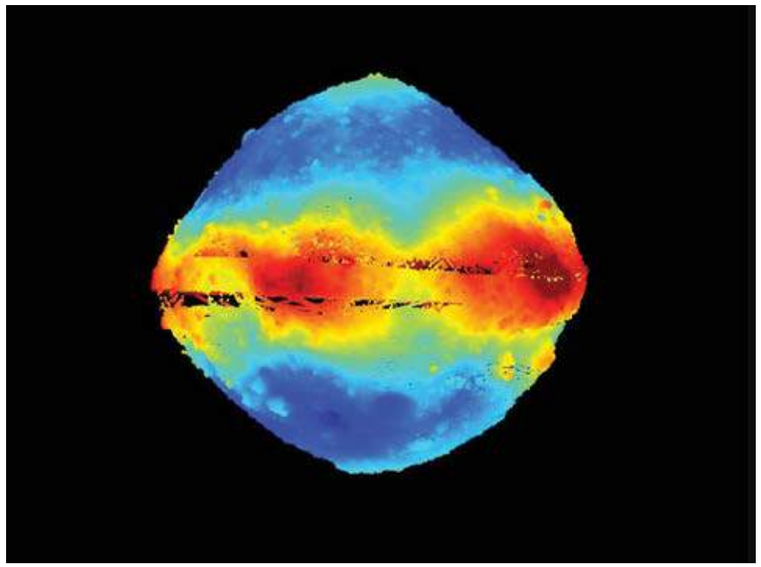
Amazon has filed plans with the International Communications Union (ITU) to put 3,236 internet satellites at three different altitudes in space to improve internet connectivity around the globe. This will be in competition with OneWeb, Spacex, Facebook, Boeing and LeoSat with more advanced plans.

Source:
https://www.geekwire.com/2019/amazon-project-kuiper-broadband-satellite/

BepiColombo

A mission consisting of two science orbiters ESA's Mercury Planetary Orbiter (MPO) and JAXA's Mercury Magnetospheric Orbiter (MMO) was launched on 20 October 2018 and passed its near-Earth commissioning phase on 26 March 2019. It will reach Mercury its ultimate objective by end of 2025.

Source:
http://www.spacedaily.com/reports/BepiColombo_is_ready_for_its_long_cruise_999.html



Bennu

The 3-D Image of Asteroid Bennu created by the Canadian Space Agency, on NASA's OSIRIS-REx spacecraft from a height of less than 1.2 miles (2 km) above the surface – the closest orbit ever achieved by a spacecraft. Image: NASA/University of Arizona/CSA/York University/MDA.

Beresheet

Israel's first lunar mission failed on 11 April when this privately funded moon lander crashed during descent. Its main engine failed during the final descent to a landing site in the Sea of Serenity in the northern hemisphere of the moon. The project's final cost was around $100 million and made Israel the 7th country to enter lunar orbit.

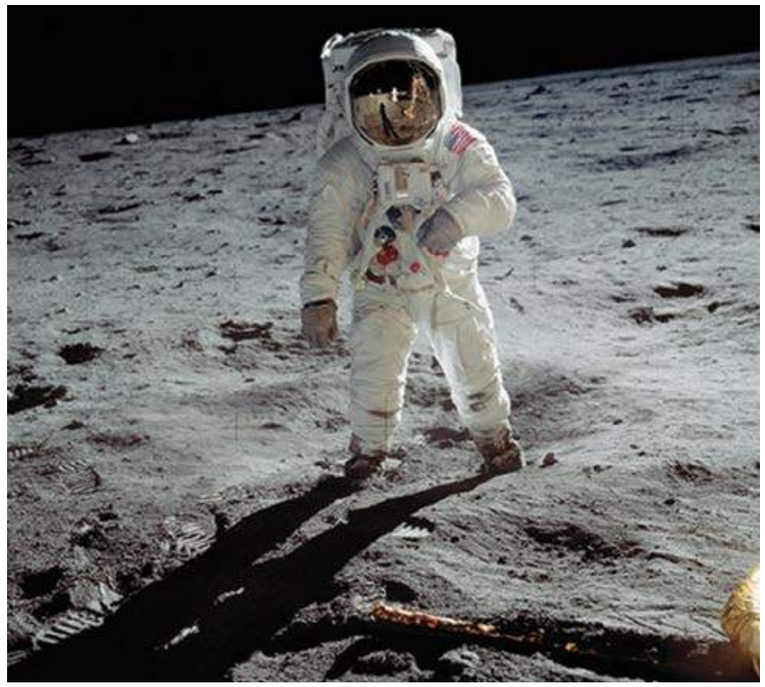
Source:
https://www.businessinsider.co.za/beresheet-first-private-moon-mission-fails-lunar-landing-2019-4

Black Hole

First picture ever of a black hole 6.5 billion times the mass of our sun in the Virgo galaxy cluster some 55 million light years away. Image: National Science Foundation

Buzz Aldrin

Buzz Aldrin also known as the 'Second Man on the Moon' photographed by Neil Armstrong on 20 July 1969. Armstrong's shadow and part of the moon lander can be seen reflected in the visor. Image: NASA



Black Hole

First time visual evidence of a black hole at the center of Messier 87, a massive galaxy in the nearby Virgo galaxy 55 million light years away was produced by the Event Horizon Telescope a planet scale array of 8 grond-based radio telescopes. The news was released by the National Science Foundation on April 10.

Source:
https://www.nsf.gov/news/special_reports/blackholes/

Cheops

The acronym for Characterizing Exoplanet Satellite commissioned by the European Space Agency (ESA) destined for a 700 km altitude sun-synchronous dawn-to-dusk orbit around Earth. It will study exoplanets in other star systems measuring their radius and mass to reveal their density and give clues to their structure and evolution.

Source:
https://www.satellitetoday.com/launch/2019/03/29/airbus-prepares-cheops-satellite/

Hayabusa2

This Japanese spacecraft is bound to bring back samples of asteroid Ryugu by December 2020. Currently it's orbiting the 1 km diameter asteroid 186 million miles from Earth and collecting material by way of rovers and blasting small craters in the surface to stir up dust for collection.

Source:
https://www.space.com/hayabusa2-made-crater-on-asteroid-ryugu.html?utm_source=sdc-newsletter&utm_medium=email&utm_campaign=20190405-sdc

Mars Landing

Astronauts could be on Mars by 2033 is the latest estimate by NASA Administrator Jim Bridenstine, provided the moon landing has happened by 2024. "When we go to Mars, we're going to be there for at least two years," Bridenstine said. Other estimates put a Phobos landing first by 2033 and then the Martian surface by 2039.

Source:
https://www.space.com/nasa-moon-2024-landing-mars-2033.html

Moon Landing

"If we're going to land boots on the moon in 2024, we have time and we have the ability to accept some risk and make some modifications," said NASA Administrator Jim Bridenstine during an April 1 interview in Potomac, Md.

Source:
https://spacenews.com/bridenstine-says-nothing-off-the-table-as-nasa-develops-new-lunar-plan/

OneWeb

Signal acquisition have been confirmed from six OneWeb broadband satellites launched late February from Kourou, French Guiana. This paves the way for a 650 satellite constellation launched 30 per month starting in the fourth quarter of this year to provide global commercial internet connectivity by 2021.

Source:
https://www.oneweb.world/newsroom/oneweb-secures-1-25-billion-in-new-funding-after-successful-launch

OSIRIS-REx

A spacecraft orbiting asteroid Bennu with a Canadian funded Laser Altimeter on board to create a 3-D map of the asteroid before it collects samples to be analysed by researchers on Earth. It will start its return journey by March 2021 and land 2.5 years later in September 2023.

Source:
http://54.221.250.12/canadian-instrument-creates-first-3d-map-of-asteroid-bennu/

Space technology applied in cancer detection

Doctors in the near future will be able to detect cancer within their consulting rooms with the aid of a miniaturised scanner which employs space technology used to study stars in distant galaxies.

Chris Skidmore UK Minister of State for Universities, Science, Research and Innovation

Aided by a UK Space Agency grant of £1 million experts aim to develop a portable 3D X-ray machine which will allow doctors to do earlier diagnosis of suspected tumours and administer effective treatment. This portable, miniaturized kit will have a satellite connection which will allow the scanning to be done in the doctors' surgeries and reduce the need for trips to busy X-ray and CT scanners.

The UK Space Agency's statement mentions inter alia that the 'scanner relies on technology developed for space; including field emitters etched onto silicon wafers used previously in ion thrusters and X-ray optics deployed on star mapping spacecraft such as the European Space Agency's XMM Newton mission, in which the UK played a major role.'

The Adaptix 3D X-ray machine is the first of four projects receiving a share of a £4 million innovation fund drawn from ESA's Business Applications and Space Solutions programme, to which the UK is the largest subscriber. Nick Appleyard, Head of Business Applications at the European Space Agency (ESA) said: "This is a wonderful example of how ESA supports innovation. The company that developed the portable X-ray machine, Adaptix, started life in ESA's Business Incubation Centre at Harwell in Oxfordshire and has grown to become a successful and innovative enterprise.

Mark Evans, CEO of Adaptix Limited, said: "Being incubated at the world-renowned Rutherford Appleton Laboratory in Oxfordshire's Harwell Campus, a major centre for the UK Space industry, has given us access to fantastic facilities and leading minds to support the development of our space-heritage technology."

"In addition, we have been fortunate to have received significant support from InnovateUK, the European Space Agency and the National Physical Laboratory - organisations that provide a significant capability to high-science based early-stage companies such as Adaptix.

"Our vision is to create a business that will transform radiology through the export of high-science-content high-value products to achieve revenues of more than $100m. X-ray is the primary diagnostic in healthcare – one day we hope that Adaptix technology will touch the lives of everyone that you know and being supported by the NHS through this grant will help our team realise this vision."

Science Minister Chris Skidmore said: "The challenge of working in space focuses some of the UK's most brilliant minds. These experts can also help transform our lives for the better here on Earth. The huge potential of space technology isn't just about reaching out into the universe: it's here on earth that its greatest impact can be seen, from 5G to tackling climate change or ensuring we can all benefit through space-inspired healthcare technologies such as these.

"We have committed to spending 2.4% of GDP on research and development by 2027, with space being at the forefront of our ambitions, and it's in the potential of medical advances such as these that we can see the potential massive benefits of spending more on the technology of the future, helping us to live healthier, happier lives, for longer. This is our modern Industrial Strategy in action."

The demanding environment of space means that investments in the sector generate new knowledge and innovations that extend far beyond the space industry. For example, satellites provide services that enable a wide range of economic activities, supporting industries worth £300 billion to the UK.

Source
https://www.gov.uk/government/news/star-gazing-technology-used-to-spot-cancer

Artist impression of Adaptix 3D X-ray machine which will employ space technology to detect cancer. Image: www.adaptix.com